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**HISTORICAL FUND**  
of the  
**NAVY MEDICAL DEPARTMENT**

A committee has been formed with representation from the Medical Corps, Dental Corps, Medical Service Corps, Nurse Corps, and Hospital Corps for the purpose of creating a fund to be used for the collection and maintenance of items of historical interest to the Medical Department. Such items will include, but will not be limited to, portraits, memorials, etc., designed to perpetuate the memory of distinguished members of the Navy Medical Department. These memorials will be displayed in the Bureau of Medicine and Surgery and at the National Naval Medical Center. Medical Department officers, active and inactive, are invited to make small contributions to the fund. It is emphasized that all donations must be on a strictly voluntary basis. Funds received will be deposited in a Washington, D. C. bank to the credit of the Navy Medical Department Historical Fund, and will be expended only as approved by the Committee or its successor and for the objectives stated.

It is anticipated that an historical committee will be organized at each of our medical activities. If you desire to contribute, please do so through your local historical committee or send your check direct, payable to Navy Medical Department Historical Fund, and mail to:

Treasurer, N. M. D. Historical Fund  
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### Subphrenic Abscess

The time honored anatomic and pathologic concepts of Barnard have been widely accepted and are to be found in standard textbooks of surgery. From the anatomic standpoint it is commonly believed that the coronary ligament divides the superior surface of the liver into anterior and posterior compartments. The basis for confusion is the fact that spaces are described which do not exist. The coronary ligament suspends the liver not from above, but from the dorsal aspect of the abdominal wall. (Drawings clearly illustrate anatomic points.)

Subphrenic and subhepatic spaces are large, particularly on the right side. Characteristically, these large spaces become subdivided about their midpoints by formation of pyogenic membranes. Therefore, anterior and posterior subphrenic, and anterior and posterior subhepatic, abscesses occur.

Complications of subphrenic space infection are chiefly intrathoracic because the septic process frequently spreads through the diaphragm into the pleural cavity or into the lung. Purulent exudate has a tendency to escape, and the soft diaphragm and lung constitute a less formidable barrier than do the rigid liver and posterior parietal structures.

Serous Effusion. This complication usually occurs ipsilaterally. It is seldom massive in amount unless cardiac disease is also present. It may be in evidence with subhepatic infection but is unusual. In most instances, serous effusion indicates infection above the liver. The fluid is clear, pale yellow, and has a high neutrophil and protein content. In the author's experience, it has been sterile on culture. It has not proved to be a therapeutic problem.

Subphrenic Infection with Intrathoracic Communication. If the pleural cavity is free, perforation of purulent exudate into the chest produces empyema. This may be massive and result in rapid toxicity, and unless prompt drainage of both thorax and subphrenic area is provided, death may ensue. When prompt drainage of both spaces has been carried out, the lung rapidly re-expands and healing occurs.

When pleural symphysis is present, however, a fistula forms between the subphrenic area and the bronchial tree. This condition may follow one of two general forms. An acute fulminating type of necrotizing bronchopneumonia may occur with rapid toxicity and death, or the course may be extremely indolent.

Perforation into the chest may not be a dramatic phenomenon and may be almost of the occult variety.

Experience has shown that when drainage of the subphrenic area is carried out, the pulmonary lesion usually will heal. In most cases, lobectomy will not be necessary.

Biliary Communications with the Intrathoracic Cavity. In work with postoperative strictures of the bile ducts, the author has encountered a

number of patients in whom, following secondary or complex operations, subdiaphragmatic collections of bile have developed. In turn, these collections occasionally have perforated into the thorax. If the pleura is free, a large collection of bile accumulates in the intrathoracic cavity; this disturbs intrathoracic dynamics and may cause tension unless evacuated promptly. Furthermore, secondary infection is almost sure to ensue. Management consists of correcting the intrathoracic dynamics by trocar drainage, followed by proper attention to the obstructing lesion in the biliary tract.

At times, pleural symphysis is present, and when perforation occurs, it occurs into the bronchial tree, resulting in a bronchobiliary fistula. The type of pneumonitis and bronchitis which is found in this circumstance is a serious one because of the necrotizing effect of bile. Prompt drainage of the subphrenic area is essential to stop expectoration of bile. The lesion cannot be healed until the obstruction in the common duct has been removed.

The type of abscess seen most commonly is right posterior subphrenic in location. This abscess is best reached by intrathoracic, transpleural drainage. It is not truly a subphrenic abscess but is subhepatic.

The author stresses three major points. (1) The anatomy of the diaphragm and the suprahepatic area can be made simple and clear. (2) Subphrenic abscess as seen today is a more chronic and indolent affair than in the past. Thus, it may be more dangerous from the standpoint of intrathoracic complications. (3) For cure of subdiaphragmatic abscess, a transpleural approach is required. (Boyd, D. P., *The Intrathoracic Complications of Subphrenic Abscess*: J. Thoracic Surg., 38: 771-779, December 1959)

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#### Recurrent Pancreatitis and Pancreatic Function

Little is known about the function of the pancreas of a patient surviving one or more attacks of acute pancreatitis. Dreiling has reported the results of secretin duodenal drainage tests in 48 patients following one attack of acute pancreatitis. Of these patients, 73% had normal values for bicarbonate concentration and total amylase (units/kg.) while 77% had normal volume responses.

It has been suggested that pancreatic function is impaired early in the disease necessitating early surgical intervention to prevent progression of the process. The destruction of acinar tissue by one or more exacerbations of pancreatitis could possibly lead to diminution of output of the enzymes, amylase and lipase, and, thus make serum values in future attacks poor guides to diagnosis. Furthermore, the amount of impairment of external pancreatic secretion becomes important as a possible prognostic sign for physician and patient.

Nineteen patients, having had from one to eight attacks of pancreatitis, were studied by the authors in an attempt to clarify possible altered function.



Their findings allowed the conclusion that recurrent bouts of interstitial pancreatitis affect the response of the pancreas to secretin by diminishing the bicarbonate values progressively with successive attacks. Enzyme values represented by amylase in these studies remained relatively unimpaired. Because secretin brings about production of pancreatic juice high in water and bicarbonate and low in enzymes, continued downward trend of bicarbonate production with increased number of attacks becomes significant.

One should not wait until the triad of calcification of the pancreas, steatorrhea, and diabetes are present before the diagnosis of chronic pancreatitis is made. On the other hand, more than one attack of acute pancreatitis should not lead to the conclusion that chronic pancreatitis is present. Chronicity implies pancreatic dysfunction of a permanent, unremitting nature with little hope of improvement. Presence of an impaired secretin duodenal drainage test on one occasion following an acute attack of pancreatitis does not necessarily indicate a chronic state of pancreatic insufficiency or inability of the gland to recover.

Until such time as pancreatic function becomes permanently impaired, this type of patient should be considered as a case of recurrent pancreatitis. Present data do not bear out the concept that pancreatic function is impaired early in pancreatitis, necessitating surgical intervention. The authors believe that patients with acute recurrent pancreatitis and many with chronic pancreatitis are best managed by a medical regimen, surgery being reserved for: (1) uncontrollable pain, (2) biliary tract disease, (3) jaundice, (4) pseudocyst, and (5) ruling out carcinoma or definitely establishing a doubtful diagnosis.

The slowness with which pancreatic impairment occurs as the result of multiple attacks of recurrent pancreatitis and the remarkable ability of the pancreas to recover from marked insufficiency contraindicate surgical intervention for the reason of improvement of function alone.

Amylase values in the pancreatic juice show no definite downward trend in patients with acute attacks. In chronic pancreatitis these values should be depressed. Thus, the patient with acute recurrent pancreatitis has the ability to sustain an elevation of serum amylase during an attack, whereas the patient with true chronic pancreatitis may not produce enough enzyme to allow a rise in the serum. (Pfeffer, R.B., Mixter, G., Jr., Hinton, J.W., The Effect of Recurrent Bouts of Pancreatitis on Pancreatic Function: Surg. Gynec. & Obst., 109: 716-720, December 1959)

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Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget (19 June 1958).

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### Adenocarcinoma of the Large Bowel

The report of 1,340 patients having adenocarcinoma with primary site in the large bowel is presented. The diagnoses were made between 1940 and 1955; 100% follow-up has been achieved. The median age of the patients (63 years) is several years greater than that usually reported. The 98% operative rate is worthy of note. Classification of the anatomic locations of 1,298 single lesions corresponds to the classic picture. The observation that one-third to one-half of large bowel lesions are located in sites which permit diagnosis by simple digital examination receives confirmation; 36.9% of lesions were located in the true rectum and an additional 16.5% in the rectosigmoid region.

Two-thirds of the patients with carcinoma of the colon died of their disease within a 5-year period. However, when patients underwent excisions for cure, two-thirds of those with colon cancers and one-half of those with rectal cancers survived 5 years.

Survival rates for regular curative excisions are arranged in a decreasing order of frequency by anatomic sites: transverse colon, 90%; ascending colon, 67%; entire colon, 66%; sigmoid colon, 65%; cecum, 62%; total large bowel, 56.4%; and rectum, 49%. The most easily diagnosed lesions, rectal tumors, had the least favorable prognosis; lesions present in an area often considered unfavorable for early diagnosis—the transverse colon—actually had an excellent prognosis.

Tailoring the size of the operation to the size of the grossly evident disease spread appears to have been associated with substantial success. These observations add evidence that present-day surgeons need not be bound by yesterday's dogmas. The employment of large operations for large cancers and smaller operations for small cancers would, under certain circumstances, appear altogether fitting.

Survival statistics following palliative procedures and for other cases not operated upon for cure emphasize that, in the instances in which palliative excision could be done, substantial one or two-year survivals were achieved. Colostomy was associated with about one-half of that rate. Interesting enough, patients who refused treatment appear to have survived almost as long as patients who underwent palliative excision.

Correlation of age at time of curative excision with 5-year postoperative survival rate offered evidence bearing on several currently debated questions. This study lends no support to the contention that bowel malignancies in younger patients (less than 44 years of age) are associated with an overwhelmingly poor prognosis. Another often repeated aphorism—that advanced age at operation has little bearing on prognosis—appears not to apply to patients 80 years or older. Except those few with lesions of the transverse colon, no patient of this age group with adenocarcinoma of the large bowel (other than transverse colon) achieved 5-year postoperative survival. (Gilbertsen, V.A., Adenocarcinoma of the Large Bowel: Surgery, 46: 1027-1042, December 1959)



### Surgery After Myocardial Infarction

Recent advances in medicine, anesthesiology, and surgery—especially preoperative and postoperative care—have brought the need for reevaluation of the surgical risk in individuals who have had a myocardial infarction. Studies of those who survive myocardial infarction show that long-term prognosis should be optimistic.

The authors made a 5-year follow-up of 653 patients who lived more than 2 months after their first myocardial infarction. It showed that 65% lived more than 5 years; a similar study showed that one-third lived more than 10 years. Moreover, 65% of men who returned to work after their first myocardial infarction were still working after 5 years.

In a summary of the literature as to the surgical risk in myocardial infarction of those operated on at least 3 weeks after the onset, the authors report a 5.1% mortality among 186 patients who had 253 operative procedures.

This report is based on 50 individuals who underwent major surgery at least 4 weeks after the onset of their infarction. Ages ranged from 46 to 86 years; 75% were operated on within 6 years after onset of the infarction. There were 6 operative deaths which could be related to the heart—all among men.

The majority of surgeons preferred ether or spinal anesthesia. In general, for individuals who have had a myocardial infarction, apprehension and fear, hypoxia, marked falls in blood pressure, and high spinal anesthesia must be avoided.

Sudden or relatively sudden death can occur at any time in an individual who has survived a myocardial infarction. This poses the question as to whether the operation itself caused the death of any or all of the 6 patients in this report.

While a previous myocardial infarction is not a contraindication for major surgery, each contemplated operation should be carefully considered and not lightly undertaken. Elective surgery should be postponed as long as possible. When undertaken, the risk can be decreased by meticulous medical management, skilled anesthesia, and careful preoperative and postoperative care on the part of the surgeon.

The authors consider that their study confirms the experience of others that myocardial infarction after at least 4 weeks of treatment need not of itself ban major surgery. (Weiss, M.M., Weiss, M.M., Jr., Risk of Major Surgery in Patients with Old Myocardial Infarction: Surgery, 46: 1094-1098, December 1959)

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Please forward requests for Change of Address for the News Letter to: Commanding Officer, U.S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

### The Adolescent Diabetic Patient

In recent years there has been an ever increasing number of young persons in the diabetic population. A better understanding of diabetic management, plus availability of efficient adjunct therapy, has brought about a prolongation of the life of juvenile diabetics which was not seen 25 years ago.

When a physician is confronted with an adolescent (puberty to age 20) diabetic, he must manage a patient who is afflicted with carbohydrate metabolism which is far more unstable than that of older patients. Wide fluctuation in concentration of blood glucose is the rule, and ketosis can occur rapidly. Frequently, with onset of hyperglycemia, the young diabetic will notice dryness of the mouth, sudden fatigue, or drowsiness which appears before significant glycosuria develops to cause symptomatic polyuria. Of particular importance is the marked degree of hypoglycemia that occasionally may occur when only a small excess of insulin is administered. Also, there is often a delay in the compensatory output of glucose by the liver, and concentration of blood glucose may remain low for a long period.

In cases of juvenile diabetes, inefficiency of carbohydrate homeostasis necessitates a regimen of close observation and regulation. Controlled eating habits are essential for the comfort of the patient and for control of the unstable metabolic state.

Caloric requirements for adolescent diabetics are presented in table form emphasizing that the number of calories per pound of body weight is decreased after cessation of growth. A common mistake is prescription of insufficient calories for the growing active teenager.

It is advisable to evaluate the patient's caloric needs at intervals of 6 months or less during the adolescent period. If his diet is not increased when indicated, he may refuse to follow any dietary regimen. An inadequate diet usually leads to irregular eating habits and gross lack of control.

The type of insulin used and timing of its administration will be determined by the degree of control desired.

There is increasing use of lente insulins. These products are more refined than other earlier types and currently are available in three preparations: semilente, a rapid-acting type; novolente, usually referred to as lente, which has a timing similar to that of NPH insulin and globin zinc insulin; and ultralente which has a longer time of action than protamine zinc insulin. Mixtures may be used and it is possible that, in the future, combinations of the lente insulins will suffice for most needs.

Orally administered hypoglycemic agents developed to date have not proved to be satisfactory substitutes for insulin in treating juvenile diabetes. They have no effect in the young diabetic except possibly at the very onset of his disorder. Phenformin hydrochloride (DBI) appears to have some effect, perhaps acting as an adjunct to insulin and helping to stabilize the particularly "brittle" patient. However, there is a high incidence of side effects.



Use of qualitative urinary sugar determination is the simplest means of judging control over a period of time. In the author's experience, it is difficult to utilize single blood sugar determinations as a guide to control because, in the active teenager, concentrations may vary rapidly between high and low levels. Close chemical control cannot be achieved, practically, as the adolescent diabetic experiences frequent hypoglycemic episodes when control is too precisely maintained. The best control that the author has been able to obtain in the active young patient is an average of two sugar-free urine tests daily.

Ketosis is closely linked to fluctuation in concentration of blood glucose and should be considered deleterious, not only because it may herald development of acidosis, but also because it signifies disordered carbohydrate metabolism and a negative nitrogen balance. Chronic ketosis may be a clue to presence of a hidden infection.

Ketosis and acidosis are considerably more frequent in cases of adolescent diabetes than in older patients. They may develop before significant hyperglycemia occurs, and there may be absence of polyuria or thirst.

Principles of therapy of acidosis in young diabetics are similar to those of older patients. However, certain aspects are worthy of comment. First, in case of mild acidosis, because concentration of blood glucose may not be unduly increased when the patient is admitted to the hospital, it may be wise to administer 5% glucose solution in physiologic saline solution from the beginning of treatment. Second, the sensorium of a young diabetic usually will clear more rapidly than that of an older diabetic, and oral fluids may be given earlier. Third, severe potassium deficiency may occur in juvenile diabetics as in older patients.

Diabetic acidosis is one complication that is preventable and reversible. There is little excuse for its development if the patient is managed well.

Because juvenile diabetics are sensitive to insulin, they are prone to undergo more severe and more prolonged episodes of hypoglycemia than are older diabetics. All juvenile diabetics should carry some form of carbohydrate as a preventive measure. In particular, exercise is likely to precipitate an insulin reaction.

Although tuberculosis and pyelonephritis commonly occur in the diabetic, they may be looked for particularly in the younger patient. The latter is one of the most serious complications of diabetes. Uremia is the most common cause of death of the juvenile diabetic; at the Joslin Clinic, pyelonephritis is a major causative factor.

In growth and development of the juvenile diabetic, retardation has been a common observation. Now, it is generally believed that poor control during the critical period of growth has been responsible. With current standards of control and nutrition, growth of juvenile diabetics usually is normal. Another problem in development concerns occasional delays in development of puberty in both sexes. In girls, the menarche may be delayed



and irregular menstruation may be a frequent complaint. However, there is no evidence of decreased fertility in the diabetic woman of childbearing age.

Authors do not agree that poor control is responsible for the early occurrence of degenerative complications. Nevertheless, most authors believe that an attempt should be made to maintain reasonably precise control of diabetes. However, it does not seem logical to carry control to the point where maintenance of aglycosuria necessitates a life of reactions and curtailed activity.

If there has ever been a disorder in which good psychosomatic approach is essential for proper management, it is juvenile diabetes. There are few diseases wherein the physician must know and understand all aspects of his patient as thoroughly as in this condition. Successful treatment requires that the patient have confidence in his physician and be willing to follow his advice. A sincere interest in the patient's welfare must be developed. The patient must be constantly reassured that he can lead a normal life if he will cooperate with his physician.

At present, the life expectancy of the juvenile diabetic is limited. In the large group of cases reported by White, few patients lived for more than 35 years after development of the disease. However, a brighter outlook can be held for young persons in whom diabetes is developing at present, because in the future it is likely that not only will adjunct therapy be further improved, but there should be better knowledge of the mechanism of production of degenerative vascular processes. (Knowles, H. C., Management of the Adolescent Diabetic Patient: Postgrad. Med., 26: 766-772, December 1959)

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### Complications of Infectious Mononucleosis

Since the initial description in 1889 delineating it as a benign infection of children, much has been added to the descriptive knowledge of infectious mononucleosis. However, the underlying cause remains obscure. Detection has become more certain, and it has become more evident that this disease may produce marked derangement in normal physiology and pathology, and may progress to a fatal ending. The authors focus their attention on the kaleidoscope of complications that may occur.

Neurologic. Incidence of neurologic complications of infectious mononucleosis has been reported to be 1% or less; however, the mortality may be 15 to 40% in these cases. Complications may become manifest as encephalitis, peripheral neuritis, meningitis, ataxia, diplopia, coma, hyperesthesia, nystagmus, papilledema, and mental confusion. Meningeal irritation, headache, and visual abnormalities are usually the first clinical signs of neurologic involvement and may precede the more classic manifestations of infectious mononucleosis by several days. Electroencephalograms have been used to detect the more subtle changes. Cortisone has been reported to be of benefit in these complications.



The first reported case of infectious mononucleosis complicated by the Guillain-Barre syndrome occurred in 1945. This is now recognized as one of the occasional complications.

Spinal fluids generally have been reported as negative for heterophil antibodies, but the presence of atypical lymphocytes may be a clue to diagnosis. While complete recovery is the rule, permanent neurologic deficit or death may occur. Respiratory paralysis has been responsible for death in more than 20 reported cases.

Ocular. Papilledema without neurologic involvement in association with infectious mononucleosis has been reported. Tanner divides ocular complications into two groups: (1) those possibly due to direct involvement of the eye and its adnexa by the characteristic pathologic lesion (conjunctivitis, periorbital and eyelid edema, uveitis, optic neuritis, papilledema, and retinal hemorrhage); and (2) those affecting vision as a result of a lesion not in the eye proper (extraocular muscle palsies, ptosis, nystagmus, hemianopsia, and scotomata). This author found the most common eye complaint to be pain in or behind the eyes, and edema or redness of the conjunctiva.

Pulmonary. In an epidemic of infectious mononucleosis in 1946, pulmonary complaints were reported in 5% of patients—cough, wheezing, sputum, and rales. Roentgenographic changes—a picture indistinguishable from that of primary atypical pneumonia—was present in 2.7%. Others have found similar findings; and additionally, pleural effusion, one case of which was hemorrhagic.

Renal. In cases of one report in the literature, the kidneys showed infiltration of lymphocytes in the interstices of the cortex and the periphery of small blood vessels without any evidence of alteration in the nephrons. In a 1933 epidemic, hematuria occurred in 6% of cases, probably representing interstitial nephritis. Microscopic findings in urine frequently may show albuminuria, pyuria, and occasional hyalin casts, but evidence of permanent impairment of renal function has not been presented in the literature to the present time.

Cutaneous. Analysis of 210 sporadic cases by one observer revealed that 7.6% have cutaneous manifestations. These occurrences may be practically unlimited in nature and are described as maculopapular, vesicular, herpetiform, erythematous, or scarlatiniform types of rashes. Eruptions appear generally during the first phase of the disease and fade within a few days. Sites of predilection are the trunk and arms, occasionally the face and forearm, and rarely the hands, thighs, legs, or feet. Of interest is the enanthem which is typically described as multiple pinpoint petechiae on the palate. These generally appear 3 days to 2 weeks following onset of symptoms and last approximately 3 to 5 days.

Abdominal. Some authors report rupture of the spleen as the most common single cause of death in infectious mononucleosis. Incidence of



splenomegaly has been estimated as 40 to 80%. This complication is rare before the end of the second week because this period is required for pathologic changes to occur. Minor trauma, such as defecating, vomiting, getting out of bed, or palpation may be sufficient to produce rupture.

In addition to splenic rupture, patients may present abdominal pain which may simulate an acute abdomen. The most likely etiology is lymph node engorgement and hyperplasia; however, there have been reports of infectious mononucleosis associated with pancreatitis, with pain over McBurney's point.

Hepatic. Liver involvement in infectious mononucleosis is somewhat difficult to assess; however, available information would seem to indicate an incidence between 85 and 100%. The lesion is a form of hepatitis which in most instances, is clinically and microscopically indistinguishable from that produced by viral hepatitis. Jaundice as a complication, first reported in 1926, is now reported in approximately 5% of cases. While it is generally assumed that recovery is complete from this form of hepatitis, there have been case reports raising the question of chronic liver disease resulting from infectious mononucleosis. In 1952, a fatal case of infectious mononucleosis with acute hepatic necrosis was reported.

Hematologic. Hemolytic anemia may accompany infectious mononucleosis. Possible mechanisms for this process are: (1) destruction of red blood cells by disease or overactive spleen; (2) action of the virus; and (3) possible formation of hemolytic immune bodies. In addition, infectious mononucleosis may exacerbate some inherent abnormality in the red cells, thus producing an anemia. Hemolysis, as a rule, begins early in the course of the disease with sudden, explosive onset and is usually self-limited. The Coombs' test may or may not be positive. Steroids have been reported to be of value.

While it has been recognized for some time that a mild bleeding tendency characterized by epistaxis, ecchymoses, petechiae, and hematuria, may be associated with infectious mononucleosis, severe bleeding episodes and thrombocytopenia have been considered rare. Recently, reports of bleeding episodes with massive rectal bleeding, hemoptysis, hematuria, and severe thrombocytopenia associated with infectious mononucleosis have appeared.

Cardiac. Most observers have believed that cardiac manifestations of infectious mononucleosis are subclinical and are manifested only by transient electrocardiographic abnormalities. Necropsy studies have demonstrated that severe cardiac abnormalities may be produced by the disease. In an analysis of 100 cases of infectious mononucleosis receiving electrocardiograms, only 5% of the tracings were considered abnormal; the abnormalities were prolonged P-R interval, A-V block, increased Q-T duration, and flattened T waves. Various conditions, including myocarditis, congestive heart failure, and transient bundle branch block have been reported; and in the



differential diagnosis of nonspecific or idiopathic pericarditis, infectious mononucleosis should always be considered. (Erwin, W., Weber, R.W., Manning, R.T., Complications of Infectious Mononucleosis: Am. J. Med., 238: 699-711, December 1959)

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### Clinical Status of Lipid-Mobilizer Hormone

A lipid-mobilizing hormone (LM) was discovered in 1954. Conversely, investigators working with rats and dogs demonstrated a lipemia-clearing effect with hyaluronidase, hyaluronate, and deoxycorticosterone. At the same time, they found that the lipemia-clearing effect of these substances could be inhibited by administration of cortisone, stress, and nephrosis. Experiments revealed that the pituitary was essential for release of LM while other work further defined the pituitary as either producing or storing the hormone. Primary action of LM is mobilization of triglycerides from omental and mesenteric depots.

Exogenous LM. When LM was intravenously injected into patients either fasting or on a low-fat diet, there resulted a remarkable elevation of plasma cholesterol, fatty acids, and lipid phosphorus which was sustained as long as the injections were continued. There was no evidence that LM enhanced metabolism of lipids which were mobilized by it. When LM was administered to other patients on a high-fat diet, the hyperlipemic response was not observed. These observations indicated that an appropriate metabolic state was necessary for the lipid-mobilizing effect of LM to be elicited or manifest, or both.

Experimental studies revealed that development of hyperlipemia depended on capability of the liver to cope with the lipid load presented. Adequate stores of glycogen would permit the liver to retain and metabolize mobilized triglycerides, whereas severe depletion of glycogen modified liver lipid metabolism with resultant peripheral lipemia.

Endogenous LM. From the author's studies and related observations, the following physiologic mechanism for acute mobilization of lipids to the liver was delineated:

1. Stress may stimulate the anterior pituitary to discharge corticotropin (ACTH) into the circulation.
2. The adrenal cortex responds by discharging glucocorticoids.
3. The latter, in turn, leads to release of LM from the posterior pituitary.
4. LM acts on the omental fat depot to release neutral fats into the portal circulation.

Other studies confirmed elevation of plasma cholesterol and fatty acids during the course of pregnancy. Increased plasma LM activity was found to



be present during the second and third trimesters and, occasionally, in the first trimester. From their observations, in contrast to plasma lipids, LM appears to traverse the placental barrier.

Further work revealed that persons with familial lipid dyscrasias presented, apparently at all times, an amount of circulating lipid-mobilizer hormone definitely increased over that found in the plasma of nonstressed normal persons. Whether this condition is primary or secondary is undetermined.

Blocking Effect of PDHA. Because derangements of normal dynamics of lipid mobilization may have important clinical implication, considerable attention has been devoted to development of means of blocking or counter-acting LM activity. One of the most promising approaches has been through the use of PDHA—partially depolymerized hyaluronic acid. After experiments showed inhibition by PDHA of the acute response to LM, the authors undertook long-term administration of this material in patients with a familial lipid dyscrasia who have been shown to carry increased amounts of LM in their plasma. Suppression of circulating plasma fatty acids and cholesterol has been striking. No untoward effects have been noted, although it is stressed that the study of PDHA in chronic lipemic states is in a preliminary phase and conclusions regarding its long-term implications are not warranted at this time.

It is believed that these observations with LM hormone may be of further significance in that they provide a means whereby much data, heretofore unrelated, can be integrated into a picture that is physiologically meaningful. For example, in such superficially diverse states as post-traumatic "fat embolism," hereditary hypercholesterolemia, hereditary hyperlipemia, pregnancy, and nephrosis, it appears that the hyperlipemic component of each is mediated through the lipid-mobilizer hormone pathway. Similarly, the finding that the action of LM is inhibited by oral administration of PDHA may have evident therapeutic value. (Zarafonitis, C. J. D., Seifter, J., Baeder, D. H., Current Clinical Status of Lipid-Mobilizer Hormone: A. M. A. Arch. Int. Med., 104: 974-981, December 1959)

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#### Bioastronautics Conference

Rear Admiral Bartholomew W. Hogan, Surgeon General of the Navy, has announced completion of a planning conference for the purpose of establishing a long-range program in the field of bioastronautics. Representatives from the office of the Chief of Naval Operations, Office of Naval Research, Bureau of Naval Weapons, Bureau of Medicine and Surgery, and several of BuMed's field activities were present during the 5-day conference. Chairman of the conference was CAPT Clifford P. Phoebus MC USN, Director of the Bureau's Astronautical Division.



A summary of the conference revealed that the first 3 days were spent in laying background information upon which participants might base their planning, and in presentations from individual laboratories and organizations.

At the end of the third day, an over all objective for the bioastronautics program was formulated and defined as follows: to carry out such research, development, test, evaluation, and such other basic support as may be required to enable the Navy to place, support, and maintain men in space weapon systems in order to meet Navy operational requirements in coordination with the National Space Program.

The outline for the program having been agreed upon, the next step was to plan for further implementation of the planning effort. All activities were directed to proceed with an exhaustive analysis of the nature and scope of their interests in the various problematic areas relevant to bioastronautics and to report their findings to BuMed not later than 1 February 1960. As soon as possible thereafter, Commanding Officers and Technical Directors of the laboratories will be reassembled in the Bureau of Medicine and Surgery to determine the final nature of the program for the immediate future. (TIO, BuMed)

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#### Applications for MSC Training

Objectives, operating principles, and established curriculums for the Medical Service Corps training program are set forth in BuMed Instruction 1520.12A which was announced in the Medical News Letter of 22 January 1960. Eligible officers are encouraged to submit applications for the curriculums enumerated. For fiscal year 1961, requests are particularly invited from interested officers for the following:

<u>Curriculum</u>	<u>Location</u>
Navy Management	USNPG School, Monterey, Calif.
Administration-General	George Washington University, Washington, D.C.
Comptrollership	(same)
Nuclear Science	University of Rochester, Rochester, N. Y.

Eligibility requirements and description for each course are outlined in the instruction. In view of the late promulgation date of the instruction, the date of 1 February set for receipt of applications for full-time courses commencing in the first quarter of the fiscal year will be extended to 1 March for this year only.

For the course, Administration-General, listing of courses and estimate of cost required by par. 8 of the instruction is not applicable. However, a copy of all transcripts of college work completed must be furnished. The curriculum content will be developed to fit the background of the individual.

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### FROM THE CHIEF OF NAVAL OPERATIONS

Almost daily, thousands of Navy men and Marines serving in ships overseas and in foreign lands are helping peoples of other nations to understand America. And, more importantly, they are bringing an understanding that America's national task is to help establish internationally a just and lasting peace. This is a goal President Eisenhower has aptly pictured as "peace and friendship, in freedom."

It is continually gratifying to note the good impression our men are making on local citizens as our ships visit ports throughout the free world. These positive programs of people meeting people make Navymen and Marines among the best ambassadors our country has abroad. This fact has not been overlooked by the national press. You may have seen, as I have, more and more favorable printed comment about the contributions of our servicemen abroad.

Today's Navymen and Marines are mature, responsible individuals, eager to take part in a program designed to let the world know America and Americans know the world.

This responsibility, accepted by our men the world over, is being pursued with dignity and self-respect in the hope that the end result will be a better world in which to live.



ARLEIGH BURKE



### New Educational Program for NC Officers

A new educational program for Navy Nurse Corps officers has been established recently by the Surgeon General to be conducted within the command of the U. S. Naval Medical School, National Naval Medical Center, Bethesda, Md.

The objective of the program is to provide improved patient care for military personnel and their dependents through continuing professional development of Nurse Corps officers. The program will include planning and conducting conferences, institutes, short courses, seminars, and workshops in various phases of patient care, supervision, teaching and nursing service administration. The first workshop, "Planning Orientation Program," is scheduled to commence on 14 February 1960 at the Medical School.

Course schedules, eligibility requirements, and procedures for making application to participate in the program are included in leaflet literature distributed to all naval medical activities at which Nurse Corps officers are assigned. The courses are presently offered only to those Nurse Corps officers on active duty in the continental United States.

CDR Rita D. Clark NC USN is assigned as Head, Nurse Corps Training Section at the Medical School and will direct the new educational program. (TIO, BuMed)

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### From the Note Book

Surgeon General in Caribbean and South America. RADM B. W. Hogan, Surgeon General of the Navy, along with Dr. Frank B. Berry, Assistant Secretary of Defense (Health and Medical), and the Surgeons General of the Army and Air Force, toured Caribbean and South American countries for a 2-week period beginning 28 December 1959. The tour was in connection with the work of the Inter-Departmental Committee on Nutrition for National Defense, and included Puerto Rico, Panama Canal Zone, Chile, Peru, and Ecuador. (TIO, BuMed)

CAPT Anderson to the Sudan. At the request of the State Department, CAPT E. A. Anderson MC USN, Senior Medical Officer, Naval Air Station, Quonset Point, R.I., went to the Sudan on 29 December 1959 to help combat a flareup of yellow fever in that country. CAPT Anderson's skill in the use of pneumatic guns allows inoculation of a large number of people in a short period of time. In the past, CAPT Anderson answered a similar summons from Thailand. (TIO, BuMed)



Male Nurse Corps Officers in Army. An article in "The Stethoscope," the paper of Fitzsimons General Hospital, Denver, Colo., citing arrival of four new nurses (three male) for staff duty, prompted a call to the Army Surgeon General's office. Information supplied by the Nursing Division reveals that the Army has been commissioning male nurses since 1956, and currently has some 200 to 220 on active duty.

NAMRU-2 Investigating Skin Tests. As part of extensive geomedical studies being conducted by Naval Medical Research Unit No. 2 in Taiwan and countries of Southeast Asia, LCDR Raymond Watten MC USN and CDR Robert Kintz MSC USN of NAMRU-2; CAPT James Burke MSC USA, and Dr. S. Lin of the 406th Army Medical General Laboratory in Japan, completed preliminary investigations in December 1959 in the use of intradermal tests for diagnosis of schistosomiasis, paragonomiasis, clonorchiasis, and fasciolopiasis. On this cooperative project, skin tests were performed on 2,000 school children and adults in the western and southern areas of Taiwan where these diseases are endemic.

Uterine Cancer Detection. Dual smear examinations (vaginal aspiration and cervical scraping smears) in a screening survey for uterine cancer are considered to be highly effective in detection of carcinoma of the cervix and adenocarcinoma of the fundus. Continued examinations of both types of smears seem justified since both specimens have a definite diagnostic value. (Song, Y. S., et al., Am. J. Obst. & Gynec., November 1959)

Treatment of Hypertension. Employing trimethidinium methosulfate (Ostensin, Wyeth), one of the newer agents with ganglionic blockade and central effect, the author reports prolonged action of the compound upon oral administration, requiring use not more often than twice a day. The side effects are usually of mild to moderate degree, and may include dryness of the mouth, constipation, blurred vision, and some degree of postural hypotension. However, central nervous system manifestations and severe gastrointestinal complications sometimes seen with use of other ganglionic blocking agents did not occur. If present observations are confirmed, the drug appears to have merit over other ganglion-blocking agents presently in use. (Borhani, N., Ann. Int. Med., November 1959)

Aid in D. D. of Effusions. Increases in serum lactic dehydrogenase in malignant conditions have been attributed to release of the enzyme from malignant cells. The author's study demonstrated that the concentration of this enzyme in effusions of malignant origin was higher than with other conditions, and higher than serum levels of the same patient. Therefore, comparative studies of serum and effusion lactic dehydrogenase seem to be of great help in the differentiation of benign and malignant conditions. (de Torregrosa, M., Am. J. Med. Sci., November 1959)



Chronic Pyelonephritis. Observations of the authors indicate that treatment of chronic pyelonephritis with a mixture of drugs is unlikely to cure more patients than the use of a single agent that is effective in vitro. Bacteriologic relapse after treatment with a combination of antibiotics was more often due to new strains or strains previously present in insignificant numbers than when a single drug was used. (McCabe, W., et al., A.M.A. Arch. Int. Med., November 1959)

Nicotinic Acid and Fibrinolytic Activity. Present methods of anticoagulant therapy have proven beneficial in treatment of thromboembolic phenomena. However thrombi already formed are not lysed. The authors studied the effect of nicotinic acid in induction of in vivo fibrinolytic activity and showed that intravenous nicotinic acid will activate plasminogen. They also observed that it can be given in a slow infusion with activation of plasminogen and a minimum activation of the flushing mechanism. (Wilson, W., Fostiropoulos, G., Am. J. Med. Sci., November 1959)

Adrenals and Cholesterol. A recent report from the National Institutes of Health indicates that stress-induced overactivity of the adrenal glands may be an answer to how the body translates high tension living into excessive amounts of cholesterol in the blood. A potent fat-mobilizing pattern of hormone activity has been found in dog experiments by Dr. Eleazar Shafrir, visiting scientist from Israel, and Dr. Daniel Steinberg, chief of the Heart Institute's Metabolism Section. The pattern involves synergistic action of secretions from both the cortex and medulla. (HEW Dept. release)

Blood Clotting Factors. Out of the miasma of information and confused terminology often created by the investigators themselves—typified by two of the blood clotting factors being described by thirteen different terms and a third by twelve, and one factor being given four different names by a single investigator—Dr. Irving S. Wright attempts to organize chaos and condense the present status of studies concerning factors which occur in the plasma and serum which play significant roles in the clotting of blood. (Ann. Int. Med., November 1959)

Hemagglutinins in Viral Hepatitis. Two recently described agglutination tests have been assessed for their possible value in studies concerned with human viral hepatitis. The rhesus erythrocyte agglutination test was not found to yield sufficiently significant results. The chick-cell agglutination test gave results which showed a striking contrast between patients with viral hepatitis and those with a variety of other diseases or "normal" subjects. (Collum, R., et al., Am. J. Med., November 1959)

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**RESERVE****SECTION**Seminar in Submarine and Diving Medicine

A research Reserve seminar in submarine and diving medicine will convene at the U.S. Naval Submarine Base, New London, Conn., for a 2-week period commencing 21 March 1960. This will be the second seminar sponsored by the Office of Naval Research in cooperation with the Naval Medical Research Laboratory and the Commander, Submarine Force, U.S. Atlantic Fleet. The seminar will present information concerning the physiologic, psychologic, and environmental problems related to submarine and diving operations.

Quotas have been allocated to the First, Third, Fourth, Fifth, Sixth, Eighth, and Ninth Naval Districts. Eligible are: members of the Research Reserve Program with first priority; Medical Corps and Medical Service Corps officers engaged in allied medical research; and submariners. Interested eligible officers should make application to their naval district commandant at the earliest opportunity. SECRET security clearance is required.

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Invitation to Join Naval Historical Foundation

If you're interested in naval history, now is a good time to take a look at the operations of the Naval Historical Foundation.

The Foundation is a private, nonprofit, self-supporting, nongovernmental organization, dedicated to the preservation of the national heritage of maritime history and tradition. It tries to clarify the significance of seapower, including all its merchant and naval components, for the general public. The Foundation collects and preserves materials, including pictures, relics, manuscripts, and books. Also, it reproduces and distributes naval historical material.

One of the main functions of the Foundation is operation of the Truxtun-Decatur Naval Museum located at 1610 H Street, N.W., Washington, D. C.

The Foundation receives its financial support chiefly from a dues-paying membership. Income is supplemented by trust funds and from irregular contributions by public spirited individuals and groups.



Reservists are invited to join the Foundation. Additional information concerning membership may be obtained by writing to the Naval Historical Foundation, c/o Navy Department, Washington 25, D. C. (The Naval Reservist, December 1959)

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#### A Salute to Captain Leberman

At sea, on 8 July 1959, the USNS GENERAL WILLIAM O. DARBY (TAP 127) received an urgent message from the Swedish freighter M/S FEDALIO for immediate medical aid to a stricken passenger. CAPT Paul R. Leberman MC USNR who was serving on active duty for training on board the DARBY volunteered to board the FEDALIO and render necessary medical assistance. Accordingly, for his response to the patient's need, CAPT Leberman received the following commendation from the DARBY's Master:

"On 8 July 1959, in response to an urgent message from Swedish freighter M/S FEDALIO requesting immediate medical aid, the DARBY promptly answered and carried out medical assistance measures.

It is a pleasure to pass on to you a 'Well Done' for the part played in this operation. Your voluntary service of outstanding and courageous performance in boarding the vessel and giving successful medical aid to the stricken passenger, during rough weather conditions and with little regard for your own safety, deserves credit upon yourself, MSTs, and the Navy."

CAPT Leberman is an active Naval Reservist with many interests. He is a member of Medical Specialist Unit 4-4; Consultant in Urology, U.S. Naval Hospital, Philadelphia, Pa.; Commandant's Representative and Associate Professor of Urology at the University of Pennsylvania School of Medicine; and Chief of Residency Training in Urology at the University of Pennsylvania Graduate Hospital.

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#### Reporting Professional Achievements

The Annual Qualification Questionnaire is the proper medium for reporting professional achievements. Inactive Naval Reserve Medical Department officers should utilize block 16 or the reverse side of the form, NavPers-319, Rev. 1-59, to indicate accomplishments along with descriptive data considered essential for adequate identification.

This information is published in view of the fact that a considerable number of technical papers, pamphlets, articles, theses, books, et cetera, are being forwarded to the Chief of Naval Personnel with the request that such items be filed with official records. This material is not appropriate for file and is returned to the sender when received.

NOTE: Inactive Reserve Medical Department officers must continue to furnish the Chief, Bureau of Medicine and Surgery, evidence of certification by American Boards or membership in one of the specialty societies.

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#### Change of Reservists' Addresses

All inactive Medical Department Reservists are requested to keep the Chief, Bureau of Medicine and Surgery, informed of their correct mailing address.

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**DENTAL**



**SECTION**

#### Saliva Restriction on Dental Plaques

Previous studies have shown that the enzyme systems in dento-bacterial plaques on human tooth surfaces are capable of producing lactic acid in large quantities from the residual fermentable carbohydrates of dietary origin. Furthermore, the plaque pH of caries-rampant individuals is unable to return from a low level within 20 minutes when saliva is not accessible to the dental plaque.

This study attempted to determine the effect of saliva on the pH and lactate concentration of dental plaque from caries-immune persons after a 50% sucrose mouth spray. Plaque material from comparable locations on the upper molars was removed at frequent intervals during a 20-minute period following the application of a sugar solution. The pH and lactate content of the plaques taken in the presence of saliva were compared with those taken in the absence of saliva, and an acid production usually not seen in the plaque material of caries-immune persons appeared when the saliva was restricted.



It was concluded that while saliva played an important role in acid neutralization, the plaque substance of caries-immune individuals possessed such capacity for buffering that this acid was neutralized almost immediately, instead of remaining at a dangerously low level as in caries-rampant individuals. (Englander, H.R., Mazzarella, M.A., Dental Research Facility, Great Lakes, Ill; Fosdick, L.S., Northwestern University Dental School, Chicago, Abstract: J. Dent. Res., July - August 1959)

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### Discipline and the Dental Officer

A Dental officer cannot favorably influence the conduct of the men under him unless he sets a good example. He must look the part of a Naval officer and must act in a military manner. Nonregulation officers often win the affection of their men, but they cannot gain the high respect and confidence so necessary for real efficiency and discipline.

A Dental officer cannot be influenced by personal factors. Since duty comes first, it is often necessary to have the moral courage to correct subordinates, even though they may be very close associates. Although he may believe that certain orders from his superiors are going to be unpopular, he should never suggest that "they want this" or "they said this" but should pass along the orders in the same manner as they were received by him.

Some major disciplinary problems are: disregard of regulations, poor appearance and deportment, profanity, intoxication, theft, absence without leave, and unwise informal associations.

Appearance and deportment have important influences on discipline. Appearance includes cleanliness of dress and person, completeness and condition of uniform as well as its suitability to the occasion. Deportment refers to the individual's general behavior. The throwing of cigarette butts or trash on the deck, poor posture, or use of profanity are examples of poor deportment.

The informal associations that can be expected to form in most military organizations are usually beneficial in that they foster the individual's sense of belonging. By observing these associations, the Dental officer sometimes can spot potential leaders and utilize them to further his training program. The important point is to be aware of informal groups and to be quick to take advantage of their good features. When a group or the leader of a group promises to be troublesome, the officer must act quickly. A talk with the leader may be helpful or possibly disciplinary action may be indicated.

The Dental officer has at his disposal these positive ways of controlling personnel. He can offer opportunity for advancement in rating, special liberty and leave, and selected working details.

By a word of guidance here or a warning there, the officer may often prevent the development of situations that would otherwise lead to captain's mast. He should examine the records of all personnel when they report for duty. A man who has a poor or questionable record should be called in. He should be told frankly that his record has been examined, but that it will have no bearing on his future in this officer's department. By reassuring such a man that he is starting with a clean slate, the officer can perhaps provide him with a new outlook.

The Dental officer should initiate private informal interviews with any man who is in trouble. The important factor is to locate the trouble and not let the man muddle along. At the beginning of the interview, the officer should place him at ease and encourage him to speak his mind. He should listen attentively, and ask any tactful questions necessary to ferret out the cause of the trouble because, frequently, the man will hesitate to state his real problem. A heart-to-heart talk with the backward untidy man is also recommended; if this is not effective, take all possible corrective measures to avoid sending him to mast.

It is particularly important that the men in the dental unit understand that at any time they can bring their troubles to the head of the Dental Department for a private, off-the-record discussion. Of course, this does not mean that by-passing the immediate petty officer should be encouraged, or that the men should run to the Dental officer with every petty grievance. Let the men know they can find help and advice when they have real personal problems.

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#### Graduation of Advanced Dental Technicians

Graduation exercises for ten dental technicians, advanced general, and nine dental technicians, advanced prosthetic, who have completed 6-month training courses, were recently held in the auditorium of the U. S. Naval Dental School, NNMC, Bethesda, Md.

CAPT Eric G. F. Pollard DC USN, Commanding Officer, welcomed relatives and friends of the students and introduced the speaker, CAPT John E. Flocken DC USN of the Crown and Bridge Division, Clinical Services Department of the Dental School. CAPT Flocken advised the students to develop self-leadership and not to drift into complacency and indifference.

CAPT Pollard presented letters of commendation for outstanding scholastic and technical achievement to Virginia Hartzell DT1 of Waco, Texas, and Dudley J. Wildes DT2 of Yarmouth, Maine.

CAPT Edmund E. Jeanson DC USN, Executive Officer, awarded certificates to the graduates. Both groups of dental technicians were trained under the direction of CAPT William A. Newman DC USN who assisted in presenting the commendations and certificates.



### Personnel News

Honorary Dental Consultant. Dr. Charles H. Patton, President-Elect of the American Dental Association was recently appointed Honorary Dental Consultant to the Surgeon General of the Navy. Dr. Patton, Past President of the Pennsylvania State Dental Association, comes to his new post after having served as Trustee of the Third District.

A member of the Council on Scientific Session for 5 years, Dr. Patton also, at various times, has held the presidency of the Pennsylvania Association of Dental Surgeons, Academy of Stomatology, Philadelphia County Dental Society, and the Dental Alumni Society of the University of Pennsylvania. He is a Diplomate of the American Board of Orthodontics, member of the dental staff of Philadelphia General Hospital, and Assistant Professor of cleft palate therapy at the University of Pennsylvania School of Dentistry.

Staff Dental Officers Confer at BuMed. Staff Dental officers of the 1st, 3rd, 4th, 5th, 6th, 8th, 9th, 11th, 12th, and 13th Naval Districts, the Potomac River Naval Command and the Severn River Naval Command along with the Senior Dental officers of the U.S. Naval Training Centers at San Diego, Calif.; Great Lakes, Ill.; Bainbridge, Md.; and U.S. Marine Corps Recruit Depots, Parris Island, S. C., and San Diego, Calif., recently attended a conference at the Dental Division, Bureau of Medicine and Surgery, at which were discussed programs and policies for the Naval Dental Corps for the coming year.

Captain Cooksey Presents Paper. CAPT D.E. Cooksey DC USN recently presented a paper, "The Management of Odontogenic Problems of the Maxillary Sinus," before the Parris Island Dental Study Club, Marine Corps Recruit Depot, Parris Island, S.C. CAPT Cooksey, Diplomate of the American Board of Oral Surgery, is Head of the Clinical Services Department, Naval Dental School, NNMC.

Dr. Donald A. Kerr Conducts Conference. Dr. Donald A. Kerr of Ann Arbor, Mich., recently conducted a conference on "Clinical Procedures in Periodontics" for members of the staff and residents of the Periodontics and Oral Pathology Divisions, U.S. Naval Dental School, NNMC. Dr. Kerr's discussion of treatment procedures in which staff and residents participated was well illustrated by the film, "Surgical Treatment of Periodontal Disease," demonstrating gingivectomy procedures employing the use of electrosurgery.

Dr. Kerr is Professor of Oral Pathology and Periodontology and Head of the Department of Oral Pathology and Periodontology at the School of Dentistry, University of Michigan. In addition to his affiliation with the American Academy of Periodontology, the American Dental Association, and other

national and international organizations in the fields of Periodontics and Oral Pathology, he is Secretary of the American Board of Oral Pathology and Associate Editor of "Oral Surgery, Oral Medicine, and Oral Pathology."

Table Clinics at Norfolk. The following Dental officers on duty at the Naval Dental Clinic, Norfolk, Va., recently presented table clinics at the Virginia-Tidewater Dental Association fall meeting held at the Hotel Chamberlin, Hampton, Va.: CAPT O.F. Leberman - "Updegrave Technic for Radiographing the Temporomandibular Articulation;" CAPT W.A. Aldridge - "Use of Waxing Pliers in Wax Pattern Preparation;" and CDR D.C. Hawkins - "A Technic for Constructing a Cushioned Gold Splint."

Table Clinic at Great Lakes. CAPT T.R. Hamilton DC USN and LCDR R.W. Didion DC USN, on duty at the Naval Training Center, Great Lakes, Ill., recently presented a table clinic entitled "Mass Casualty Training for Dentists" at the annual Homecoming of Marquette University. Approximately two hundred dental alumni attended the presentation.

Twenty-Five Percent Advanced in Rate. Nine Dental Technicians of the 2nd Dental Company, Service Battalion, 2nd Marine Division, received advancements in rating during August 1959. This represents 25% of the total enlisted strength of the dental company. CAPT A.L. McInturff DC USN, Commanding Officer, presented the promotion warrants.

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### Obituary

CAPT Frank J. Kalas DC USN died on December 31, 1959 at the U.S. Naval Hospital, Camp Pendleton, Calif., after a prolonged illness. CAPT Kalas was born in Cleveland, Ohio on September 26, 1912, and graduated from the School of Dentistry, University of Louisville, Ky., in June 1936. He conducted a private dental practice in Farrell, Pa., prior to reporting to the U.S. Naval Training Center, Great Lakes, Ill., in June 1941 for his first active duty.

Among other duty stations, CAPT Kalas served as Acting Commanding Officer of the U.S. Naval Dental Clinic, Guam, May to August 1954, and then as Executive Officer of the Clinic. A member of the American Academy of Periodontology and the American Academy of Dental Medicine, CAPT Kalas was actively pursuing certification by the American Board of Periodontology at the time of his death. His last duty station was at the U.S. Naval Dental Clinic, Camp Pendleton, Calif.

CAPT Kalas is survived by his wife, Mrs. Elizabeth Kalas, and one daughter, Roberta. Interment with full military honors was held at the Arlington National Cemetery.



Administrative Notes

Non-Standard Cognizance Symbol L Material. A recent study of purchases of non-standard medical and dental material at Navy medical retail stock points indicates that many activities, in comparison with similar activities, are purchasing a disproportionate amount of non-standard cognizance symbol L material. All activities should review the requirements of BUSANDA Manual, paragraphs 22002, 22310, and 22371, to determine whether the instructions for purchase of non-standard material are being followed.

New Dental Item:

<u>Stock Number</u>	<u>Item Identification</u>	<u>Unit of Issue</u>	<u>Unit Price</u>
6520-616-9457	Holder, Cotton Roll, Dental, Right and Left: Adjustable; corrosion-resisting steel; with chin clamp and saliva ejector.	Set	\$9.00

Purpose: To provide a professionally acceptable appliance for holding cotton rolls in the oral cavity during dental procedures.

Reporting Time Lost on DD Form 477. Chapter 6-150, Manual of the Medical Department, directs that any circumstances which affect the accomplishment and/or efficiency of the dental facility and which are not included elsewhere on the DD Form 477 must be reported under Part IV, Remarks. Include such items as number of workdays lost because of leave, sick list, sick leave, TAD, and collateral duty. It has been noted that many dental facilities report inclusive dates on lost time, not the actual number of workdays.

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Policy

The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.



## OCCUPATIONAL MEDICINE

### New Causes of Occupational Dermatoses

The introduction each year of hundreds of new chemical compounds by American industry broadens an already wide spectrum of potential causes of occupational dermatoses. It has become difficult to keep abreast of the names of new compounds, to say nothing of understanding the individual roles of these chemicals in causing occupational skin diseases. In spite of these obstacles, however, certain new materials and processes have become conspicuous because of their cutaneous irritant or sensitizing properties. In addition, various sources of information from field and laboratory research continue to provide new insights into some of the old causes of occupational dermatoses.

In discussing causative factors in occupational dermatoses, mechanical, physical, chemical, biologic, and plant and wood stimuli are recognized. Chemicals account for the majority of occupational skin diseases, and within the chemical and physical classifications, most of the new and interesting causes of occupational dermatoses have occurred. Among the chemicals, epoxy resins are causing more occupational dermatitis than has any other new chemical material within the past 10 years. The same experience has been noted in Great Britain and Switzerland where much of the development of epoxy resins took place. The basic epoxy monomer is made by combining epichlorhydrin and bisphenol, while the finished polymerization product results from mixing the basic resin with one of the aromatic amines which acts as a hardener. Skin contact with the basic resin and amine catalyst occurs in mixing and continues to occur during polymerization of the resin. Most basic resins and amine catalysts are known to be primary irritants as well as sensitizing agents, but certain epoxy compounds of high molecular weight tend to be less irritant and sensitizing than others. Because much of the work with these materials is performed by hand, contact is difficult to avoid. Further, because of the widespread use of these resins in the electronics, automotive, pattern-making, diecasting, aircraft, and adhesive and laminating trades, many workmen are coming into contact with them. In larger plants, the dermatitis problem has been recognized and controlled by engineering devices which collect most of the atmospheric vapors, dusts, and fumes, and also by personal methods which emphasize cleanliness



through use of gloves and/or barrier creams. Contact with the epoxies, in small plants where engineering as well as personal hygienic measures for preventing occupational dermatitis are not used, is a difficult situation to control.

In making patterns and forms, the epoxies are frequently laminated with Fiberglas sheets. Polyester resins are also used extensively with Fiberglas for laminating purposes. Past experience has shown that Fiberglas when handled in various operations tends to fragment, and the small spicules which become imbedded in the skin produce a mild foreign-body reaction, leading to pruritus and, sometimes, to secondary infection from scratching. Rarely, has Fiberglas been found to produce an allergic dermatitis. Recently, Heisel and Mitchell at Ohio State University, added further verification to show that the larger Fiberglas spicules have little, if any, tendency to gain entrance into the skin. Fiberglas becomes a problem in tooling the epoxy as well as the polyester laminates because the products are generally finished by sanding, drilling, grinding, or sawing operations. Unless the workman is well protected by clothing or performs the finishing operations in an exhaust booth, a considerable portion of the fine Fiberglas gets into the air and easily contacts the exposed surfaces of the skin of the immediate workman as well as others in the surrounding area. The British believe these operations may depolymerize a completely cured epoxy resin and thus make it reactive on the skin.

Members of the chromate family are well-known causes of dermatitis. Chrome ulcerations and allergic dermatoses have been reported from many trades. The use of chromates in diesel locomotives occasioned an unprecedented rise in dermatitis among railroad shop machinists. The chromate was used as an anticorrosion compound in the coolant circulating through the diesel radiators. It was added to radiator water as a pellet which dissolved and permitted the chemical to circulate through the cooling system. In disassembling and repairing diesel engines and the radiator system, workmen came into contact with deposits of chromium compound on the motor, in exhaust flues, and in other sections of the engines. After several law suits, the railroads discontinued the use of the dichromate solution, but recent sources indicate that some railroads have reintroduced the use of chromates in diesel radiators.

About 2 years ago, Dr's. Lewis and Schwartz investigated an unusual outbreak of facial edema and flush among a group of printers in Washington. These men were found to be contacting butyraldoxime used as an antiskinning agent in ink. When the workmen contacted the butyraldoxime and then indulged in alcoholic beverages after their day's work, they developed nausea accompanied by marked edema and erythema of the face. The Division of Occupational Health of the Michigan Department of Health reported that a pyridine compound used as an inhibitor in a degreasing compound acted in the same way under similar circumstances.

Chlorinated aromatic hydrocarbons, notably the diphenyls, diphenyl oxides, and chloronaphthalenes, are well known chloracnegens. When these materials are handled indiscriminately, chloracne can occur. In the manufacture of 2, 4, 5-T Weed Killer, intermediate aromatic hydrocarbons of the chlorinated group were discovered as the cause of chloracne in more than 200 chemical workers in one plant engaged in the manufacture of the weed killer. Chloracne can also be seen in some metal-plating plants where chlorinated waxes are used to mask certain parts of the metal not intended to be plated.

Slightly more than 500,000 machinists and allied metal tradesmen are employed in the United States. Most of these men contact a variety of soluble and insoluble cutting fluids. In the past, contact dermatitis from soluble cutting fluids was infrequent, but with the marked increase in the use of soluble fluids more cases caused by these oils are being seen. The soluble preparations are generally composed of mineral oil and an emulsifier, such as petroleum sulfonate along with a germicide of the cresol, phenol, or nitrobenzene group. Less commonly, mercurials are added. Most workmen who handle these oils every day show dry and erythematous hands and forearms, and a significant percentage of the men display nummular type eczemas of the hands and forearms. Among workmen, the eruptions are invariably attributed to the bacterial contamination within the soluble emulsion, but the bacteria are nonpathogens. The author believes that the alkaline pH of soluble emulsions and the continuous exposure to moisture are more important in causing the dermatitis than are bacteria. Oils must be maintained in an alkaline state, so they will not rust the metal which is being cut. It is possible that the workmen who develop eczematous dermatitis from contact with the soluble oils do so because of an inefficient buffering system within the skin.

Among physical agents, radiation in its many forms constitutes a number of newly recognized causes of occupational dermatoses. Skin hazards are present in production of fissionable materials for atomic use, in the production of radioisotopes and their use in research medicine in industry, and the miscellaneous uses of industrial x-ray machines and diffraction apparatus. At least five cases of radiation injury from x-ray diffraction machines have been published within the past few years. These have occurred among technical people who are well aware of the harmful potential of the x-ray beam.

Energy emitted by sunlight has various effects upon the skin, particularly in the presence of certain chemicals, including drugs. It is well known that sunlight and coal tar produce melanoderma, extremely dry skin, and keratoses of premalignant nature. The marked increase in gas and fuel pipeline operations is reemphasizing this exposure to tar-impregnated pipe wrapping paper and the hot tar being used in the present pipeline operations. A wide variety of polymorphic eruptions on the skin due to ultraviolet light calls for more insight in protecting persons whose occupations permit marked exposure to sunlight.



In the state of Florida, the well known cutaneous disease, creeping eruption, caused by Ankylostoma braziliense, constitutes a biologic cause for occupational dermatosis. Each year, Florida reports many cases of this disease among plumbers, bricklayers, ditchdiggers, and others whose work requires contact with the soil. Creeping eruption is now recognized as an occupational entity in Florida.

The subject of occupational dermatoses was one of the main themes at the 11th International Congress of Dermatology held in Stockholm in 1957. An interesting observation was made by Katzenellenbogen of Israel who studied a group of men engaged in the manufacture or handling of diethylstilbestrol pellets. He found in one plant that all of the men exposed developed gynecomastia, decreased libido, and general impotence. Eight children who had contact at home with the same workmen were affected with peculiar pigmentary changes of the skin, particularly of the linea alba. All showed marked urinary excretion of total estrogen.

In addition, a number of miscellaneous causes of occupational dermatoses which should not be overlooked are:

True contact dermatoses result from overtreatment in the first-aid station at the plant. The widespread use of mercurial antiseptics, antibiotics, and nitrofurazone (Furacin), among other topical medicaments, contributes in no small way to the problem of prolonged occupational dermatitis.

Certain industrial cleansers continue to constitute new causes. Some liquid cleansers, entirely too alkaline, have caused primary irritant effects on their users. Poor quality granulated cleansers have been found to contain abrasives mechanically harmful to the skin. Some waterless cleansers for cleansing the skin are composed of more than 50% kerosene. Others contain, in addition to kerosene, large amounts of amine which increase the irritant action of the cleanser. At least one large outbreak of dermatitis caused by waterless cleansers has been seen within the past 3 years.

Finally, in reviewing new causes of occupational dermatoses, it is still apparent that the basic mechanism of action is generally one of primary irritation, whereas the allergic reaction accounts for less than 20% of all occupational skin diseases. New chemicals capable of injuring the skin are being produced each year. When outbreaks or isolated cases of dermatitis due to new chemicals or processes occur, it is essential that this information be made known promptly to industrial physicians and consultants who will see these cases. By so doing, the diagnosis and treatment of contact dermatitis will be facilitated, and—even more important—further outbreaks can be prevented. (Birmingham, D.J., New Causes of Occupational Dermatoses: A.M.A. Arch. Indust. Health, 20: 6, December 1959)

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### DANGER - Carbon Monoxide

Carbon monoxide (CO) is the cause of more deaths than all other gases combined. Carbon monoxide—a colorless, almost odorless, tasteless, non-irritating gas—is produced by the incomplete combustion of fuels, such as coal, wood, gas, oil, and gasoline. Thus, CO poisoning may occur in a great number of industrial and everyday activities. Examples of everyday occurrences causing death include some of the following: incorrect venting of gas heaters, use of gasoline powered machinery indoors, operating an automobile in closed space while repairing, or leaving the motor running in order to heat the automobile.

Carbon monoxide is absorbed only through the lungs where it enters the blood stream in the same manner as oxygen. It exerts harmful effects by displacing oxygen in the blood because it has approximately 210 times greater affinity for hemoglobin (Hb) in the blood than oxygen. The resulting compound is carboxyhemoglobin (COHb) which will not transport oxygen and inhibits the remaining unbound hemoglobin from its normal function of oxygen transport. The results are that the patient is literally suffocated in an atmosphere containing ample oxygen. Except for this asphyxia, CO is essentially inert physiologically and is not a protoplasmic poison.

Over a period of time, as little as 0.07% (700 ppm) of CO is capable of saturating 50% of the blood hemoglobin while a few breaths of 1.0% CO may cause 60 to 80% saturation and death. The table below shows the physiologic symptoms expected at different concentrations.

#### THE EFFECTS OF CARBON MONOXIDE ON HUMAN BEINGS FOR A GIVEN TIME

(Data from Bureau of Standards)

EXPOSURE 1 hour 2 hours 3 hours 4 hours 8 hours	No Effects	Just Perceptible	Appreciable Effects	DANGEROUS	DANGEROUS	Death
	No Effects	No Appreciable Effects	Just Perceptible	HEADACHES NAUSEA	DANGEROUS	Death
	No Effects	No Appreciable Effects	No Appreciable Effects	Appreciable Effects	DANGEROUS	Death
	No Effects	No Appreciable Effects	No Appreciable Effects	Appreciable Effects	HEADACHES NAUSEA	DANGEROUS
	No Effects	No Appreciable Effects	No Appreciable Effects	No Appreciable Effects	Appreciable Effects	HEADACHES NAUSEA
	0 PPM*	50 PPM	100 PPM	200 PPM	400 PPM	1000 PPM
	* Parts per million		DANGEROUS			

Those more apt to be susceptible to CO poisoning are children, persons small in stature, persons putting forth more physical effort than others, and those with physical defects, such as bronchitis, asthma, alcoholism, obesity, and chronic heart or vascular disease.



CO asphyxia may occur in two ways: in prolonged exposure to high, but not massive, concentrations, the symptoms are a sensation of tightness across the forehead, dilation of cutaneous blood vessels, frontal and basal headache, throbbing temples, weariness, weakness, dizziness, nausea and vomiting, loss of strength and muscular control, increased pulse and respiration, and finally, collapse and loss of consciousness. All of these effects are accelerated by exercise because of the need for additional oxygen. All symptoms are seldom experienced by one person. Where the victim is exposed to a sudden massive dose, or is at rest, loss of consciousness may result without warning symptoms. In later stages of CO poisoning the blood pressure falls, muscular control is lost, reflexes are dulled and finally abolished, intermittent convulsions may occur, and breathing becomes slow and shallow and finally ceases.

Diagnosis of CO asphyxia depends upon the history of exposure, appearance of the victim, symptoms of oxygen starvation, and detection of COHb in the blood. In mild cases, the treating physician may miss the history of CO exposure because no objective symptoms may be apparent and the patient unaware of his exposure. (Anonymous, Toxicology of Carbon Monoxide: Occupational Health News letter, 7: July 7, 1958; Carbon Monoxide Continues to Kill: Occupational Health, Michigan Dept. of Health, 5: 1, Fall 1959)

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#### Decontamination of Barge Used for Radioactive Waste Disposal

A barge built for hauling sand, silt, et cetera, was modified to carry radioactive waste for disposal at sea. Radioactive waste is usually packaged in 55-gallon drums weighted to 550 pounds with sand and concrete, or placed inside large concrete blocks. Vertical pipe racks were installed longitudinally along each side of the five hoppers to allow the drums and blocks to fall freely through hopper doors at dumping times. One or more of the cement blocks delivered to the San Francisco Naval Shipyard from a non-Naval facility contained plutonium waste. Somewhere in the disposal process leaks in the concrete blocks developed, allowing the plutonium compound to percolate to the surface and contaminate the barge hoppers.

An Alpha Survey Meter was used to evaluate the extent and location of surface contamination. Surface samples were scraped and collected on smooth paper and transferred to sampling bottles for laboratory analysis. The scraped surfaces were again metered and in the rusted portions of the hoppers it was noted that scraping had reduced surface contamination about 10 times. Painted areas where the paint film was unbroken showed little or no contamination. Total contamination was estimated to be about 100 microcuries of plutonium. The problem presented to the Medical Department was

without known precedent in the Shipyard. No records of alpha decontamination procedures on ships were available. In fact, without exception, the initial response of every source contacted was "Why don't you take it out and sink it?" At times during the operations, this would have been a consummation devoutly to be wished!

Results of the survey made it appear feasible to decontaminate the more heavily contaminated surfaces by scraping with paint scrapers. This method was suggested to the Production Department and work procedures were developed.

Procedure. The barge was drydocked and allowed to dry out. An AN/PDR-10 Alpha Survey Meter was used to measure alpha activity, and areas with surface readings greater than 5,000 disintegrations per minute (d/m) per 150 square centimeters were outlined with chalk.

Heavy Kraft paper 36 inches wide was placed over the hopper doors, secured to the sides of the hoppers with masking tape to prevent loosened material from dropping into the drydock, and thus allow easy removal of scrapings with vacuum cleaners. Kraft paper was also laid on the dock floor under the hoppers to prevent accidental contamination. Workmen were provided with paint scrapers to remove the contaminated paint and rust. They scraped 1 or 2 square feet of surface at a time and then vacuumed the area.

After decontamination of the marked-off areas, the hoppers were wet sandblasted. Plastic was placed on the drydock floor extending the length of the barge to facilitate cleanup after wet sandblasting. A number of 55-gallon drums were also placed under the hopper doors to contain the spent contaminated sand. Another sheet of plastic was placed over the top of the hoppers to contain the sand and dust evolved during wet sandblasting, thus allowing better visibility for the workmen than the usual canvas covering. Some difficulty was experienced with tears in the plastic which occurred during high winds.

Wet sandblasting commenced at the bottom of the hoppers and spent sand was allowed to collect in the hoppers. After blasting, the hopper doors were opened to allow the spent sand to fall into the drums and onto the plastic covering on the drydock floor. The contaminated sand was then placed in drums and samples taken. Concrete was poured to a depth of 10 inches over the top of the drums prior to their removal to the Radioactive Materials Storage area for final disposal at sea.

Personnel Safety Measures. Six of the Scott Aviation Corporation Pressure Demand aid-supplied respirators were purchased and used during scraping of contaminated surfaces. During wet sandblasting they were used by the workmen tending the abrasive blasting machines. These respirators were found to be excellent for both protection and comfort.

All personnel entering the drydock were dressed for radioactive work. This included all clothing: shoes, booties, elbow length cotton gloves, a



surgeon's cap, and hard hats. All personnel entering the hoppers were required to wear air-fed respirators. Those working outside the hoppers wore respirators provided with filters capable of removing particles down to 0.3 micron in diameter.

Hopper areas were surveyed with the alpha meter during rest breaks for it was necessary to exercise care that the instruments remain free from contamination. It was found that scraping and vacuuming effectively reduced surface contamination below 5,000 d/m/150 square centimeters.

Air sampling during sandblasting of the hoppers was continuous in two drydock locations and downwind on the drydock caisson. All samples were well below the Maximum Permissible Concentration for plutonium of  $2 \times 10^{-12}$  microcuries per cubic centimeter. Breathing zone samples taken in the hoppers during preliminary decontamination varied from 8 to  $32 \times 10^{-12}$  microcuries per centimeter. Exposed personnel furnished specimens for radiochemical urinalysis prior to, and after, exposure. No evidence of plutonium absorption was found.

Two vacuum cleaners equipped with filters capable of removing particles down to 0.3 micron in diameter were obtained. One was made available by the United States Naval Radiological Defense Laboratory; the other was manufactured in the Shipyard from sheet metal and parts of a commercial vacuum cleaner.

Conclusions. The work proceeded well, potential hazard from airborne plutonium was controlled, and no evidence of spread of contamination was found. The actual cost of decontamination was about half of the original estimate.

A copy of the original report including drawings and pictures of the vacuum cleaner modification can be made available upon request by Medical officers and Industrial Hygienists. (Beck, H.G., CAPT MC USN, and McElhiney, J.B., Industrial Hygienist, San Francisco Naval Shipyard)

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#### Physical Heat Regulation and Sense of Temperature in Man

Heat loss from the skin to a warm environment is regulated by the anterior hypothalamus through autonomic control of sweating and cutaneous blood flow ("physical heat regulation"). Many physiologists regard the heat loss center of the hypothalamus as a relay station for afferent impulses arising in cutaneous thermoreceptors, changes in internal body temperature merely augmenting or depressing reflex excitability of the center. The author presents substantial evidence to indicate that hypothalamic temperature per se is the stimulus concerned in regulation of sweat rate and less exclusively of cutaneous blood flow. Afferents from cutaneous thermoreceptors

appear to have no neural connection with the anterior hypothalamus, although temperature sensations as such play an important role in body temperature control by modifying conscious behavior ("Pavlovian regulation").

These conclusions are based on experiments in the gradient calorimeter in which evaporative sweat rate was measured as heat loss from a human subject under steady state conditions at temperatures from 10 to 45° C. and at three levels of metabolic activity. Rate of sweating when plotted against skin temperature showed no consistent pattern, but did reveal a remarkably close linear relationship with internal temperature which was measured by a thermocouple on the tympanic membrane. The threshold for sweating lay between 36.80 and 37.00° C. For each 1/100° C. rise above this threshold, the sweat rate increased by 6.2 gm. per hour. Cutaneous blood flow measured as skin conductance bore a similar, but less precise, relationship to cranial temperature. Receptor cells in the hypothalamus are regarded by Benzinger as terminal sensory neurons—a temperature "eye" so to speak—whose threshold and response characteristics are specified above. (Benzinger, T.H., On Physical Heat Regulation and the Sense of Temperature in Man: Proceedings, National Academy of Science, 45: 6, 25 April 1959)

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#### Industrial Health Conference

The 45th Annual Industrial Health Conference will be held in Rochester, N. Y., 24 - 29 April 1960. It is jointly sponsored by the Industrial Medical Association, American Conference of Governmental Industrial Hygienists, American Industrial Hygiene Association, American Association of Industrial Dentists and, American Association of Industrial Nurses.

These annual conferences, attended by at least 2,000 industrial physicians, industrial hygienists, industrial dentists and nurses from Government, private industry, and universities, have proven to be excellent postgraduate training in occupational health.

Information received from the 1960 Conference Program Committee indicates that this year's meeting will be outstanding. The latest developments incident to rapid technologic progress, advances, and improvements in the control of industrial health hazards will be presented by top industrial physicians and industrial hygienists of the United States and Canada. A special one-day seminar for Navy delegates will be held 25 April. It is noteworthy that the Navy is the only single employer given the recognition and honor implied in the invitation of the Conference Chairman to hold a private one-day meeting as a part of the Conference.

It is highly recommended that industrial Medical officers, industrial Hygienists, and Industrial Nurses attend this Conference. Attendance of any



one individual will be contingent on availability of his activity's per diem funds. Because the Conference is sponsored primarily by nonfederal organizations, orders for attendance must be processed in accordance with SecNav Instruction 4651.8C of 13 August 1959 or SecNav Instruction 4651.14A of 14 August 1959. For this reason, applications for orders should be processed at an early date.

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#### Mercury as a Potential Hazard in Medical Laboratories

Control of mercury vapor as a possible source of toxic reactions has been well established in industry, but little information about this potential poison has been brought to the attention of those responsible for physiologic and medical laboratories. Current interest in pulmonary function centers and establishment of new laboratories in this field exposes an increased number of persons to metallic mercury, many of whom may be unaware of its danger.

The insidious nature of poisoning due to this metal is such that the patient may be relatively symptom-free for years and then acquire serious chronic illness. Although conditions in clinical laboratories are not apt to produce the more severe toxic reactions that have been seen with industrial exposure, careless handling of mercury can allow vapor concentration to rise to toxic levels. Christensen et al. report acute poisoning in an experimental respiratory chamber due to inadvertent spilling of mercury droplets with marked aggravation of symptoms with hyperventilation.

Toxic Levels of Mercury Vapor. Metallic mercury vaporizes readily; detectable vapor is found at temperatures as low as 8.5° F., and vaporization increases rapidly with rising temperature. At room temperature, saturation of one cubic meter of air involves approximately 20 mg. of mercury. When a stream of air flowing at a rate of one liter per minute passes over a 10-square-centimeter area of mercury surface at 25° C., it becomes about 15% saturated and contains approximately 3 mg. of mercury per cubic meter. In a poorly ventilated laboratory, where mercury stands in open containers and has been spattered over tables and floors, such a concentration of vapor is not improbable.

Rate of absorption through the lungs varies directly with the vapor concentration of the inspired air. Shepherd and his associates found mercury concentration of expired air to be 0 to 12 mcg. per cubic meter. None was expired when 60 mcg. per cubic meter of air was inspired. They stated that with such absorption it would be possible for a worker spending 8 hours in a laboratory, the air of which had only 15 mcg. of mercury per cubic meter, to absorb 72 mcg. of mercury during the course of a day's work, assuming an average respiratory volume of 10 liters per minute.

Portals of Entry and Absorption. In general, studies indicate that there is a rough correlation between chronic mercurialism and vapor concentrations of work areas, but not with duration of individual exposure. Inhalation of vapor and finely divided mercury-contaminated dust is one of the major routes of entry of mercury into the body, but ingestion and absorption through skin—probably by way of sweat glands and hair follicles—are also means of increasing body stores. Subcutaneous absorption where there is an area of broken skin may increase amounts absorbed. McCarroll states that wet or perspiring skin may significantly increase the rate of absorption.

In the order of frequency of symptoms observed, the predominant complaints among industrial workers were psychic disturbances, digestive disturbances, insomnia, loss of appetite, tremor, and loss of weight.

The most frequent physical finding reported is a fine intention tremor that may vary from a slight movement of the hands, eyelids, or tongue to a marked generalized involvement that may be disabling at advanced stages. It has been described as a rhythmic trembling movement of slight amplitude, from 5 to 8 movements a second which increases in extent with attempted voluntary movements. Next in order of frequency in this study came eyelids, tongue, arms, cheeks, lips, forehead, head, and legs. One patient had generalized involvement.

Psychic irritability, depression, or discouragement without cause, timidity, embarrassment before strangers, and exaggerated emotional response in general have been described as part of the toxic reaction to mercury.

Vasomotor disturbances, such as dermatographia, readiness to blush, and excessive perspiration are common.

Diagnosis. Diagnosis of chronic mercury intoxication is for the most part based on history and physical examination. Analysis of a 24-hour specimen of urine is advocated in the routine medical examination as a measure of absorption in patients exposed to mercury vapor; complete blood count is advised; dental examinations are particularly important and should be done at 6-month intervals.

Laboratory Technique. Smoking and eating in the laboratory may be responsible for ingestion of small amounts of mercury, especially if the food and tobacco are handled without previous hand washing. Recommendations for industrial workers include rinsing the mouth before eating or drinking, providing an increased milk and water intake, and avoiding working under hazardous conditions with an empty stomach because this aids absorption of mercury. When possible, employees should have an area free from any exposure for doing such work as calculations or tests that do not require the use of mercury.

Laboratory technique is most important when the metal is handled and stored. Containers should be covered or the mercury surface covered with a small amount of water if this is more practical. A film of water does not prevent vaporization, but decreases it considerably. If mercury stands in



gas-sampling tonometers ready for use, a stopper provides simple protection until the apparatus is needed. Various types of filtering devices for cleaning mercury should be covered or used in a ventilation hood. Mercury should be stored as far from immediate work areas as is practical. Trays or collecting surfaces as simple as sheets of paper creased to retain rolling drops of mercury should be supplied, and all manipulations involving mercury should be done over such areas as far as is possible.

A microscope will reveal that mercury is plentiful where none can be seen. Mercury contaminated with dust and dirt remains in the finely divided state with increased surface area causing more vaporization. If undisturbed, a protective film of oxide, grease, and so forth forms and diminishes the amount of vapor. If agitation provides fresh surface area, vapor production will increase.

Mercury that has been spilled should be wet with water and then picked up with a short piece of glass tubing drawn to a fine tip and attached to laboratory suction. Pans of water should be placed under stopcocks and other sources of mercury leakage where possible. Wooden, tiled, or concrete floors can never be entirely cleaned of spillage and under such conditions ventilation becomes the primary concern. Some advocate use of sulfur compounds as spray or as a gas for combating the hazard of mercury vapor, but sulfur compounds can be extremely toxic agents and caution with the use of such chemicals is urged.

Ventilation of Laboratories. Ventilation is usually the most effective method of reducing the vapor concentration in laboratories. Recirculation of air—the type of ventilation provided by isolated electric fans in the room—is dangerous. Vaporization of mercury will decrease in a nonventilated room owing to the layering of high concentration levels of air over the exposed surface. Moving currents of air, even if not sufficiently strong to cause surface changes of the mercury itself, will result in increased vaporization because of the increased concentration gradient; if the air is not removed from the room, high levels of vapor concentration may accumulate. There is commercially available a device which circulates air at a rate of approximately 250 cubic feet per minute that removes mercury vapor by passing the air over iodized charcoal.

In the mercury thermometer industry, local ventilation by the use of hoods maintaining a face velocity of 150 to 200 linear feet per minute should be present in all locations where containers of mercury are uncovered. General ventilation of the downdraft type is advised. Air should come in near the ceiling and be drawn out of the room at or near the floor.

New Laboratories. New laboratories being constructed must consider factors necessary for vapor control when it is known that mercury must be used. Ventilation is the most important means of control. One or more local ventilating hoods using negative pressure would be an added safety factor and a convenience in that respect.

Floors should have a smooth hard finish and should be properly sloped toward a sump or catch basin to which mercury can be flushed or drained. Concrete, tile, or board floors should be avoided. Walls should be smooth; ledges or horizontal seams are undesirable. Work tables and chairs should be covered with a smooth material that will resist surface cuts and scratches; they should be so constructed that accumulation of mercury in joints, crevices, or corners can be avoided.

Few cases of possible mercury toxicity in medical personnel come to the physician's attention, but the degree of morbidity that one may be sponsoring by allowing careless handling of this potential poison cannot at present be estimated. (Noe, F.E., Mercury as a Potential Hazard in Medical Laboratories: New England J. Med., November 12, 1959)

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